

# Optimux-134, Optimux-125

Fiber Multiplexers for 16 E1/T1 and Ethernet



- Up to 16 E1/T1 links, full bandwidth 100 Mbps Ethernet traffic multiplexed into fiber optic uplink
- Single-mode, multimode, single-mode over single fiber, SFP-based interfaces
- Range of up to 110 km (68 miles)
- Optional additional hot-swappable power supply and uplink for redundancy



Optimux-134 and Optimux-125 provide a simple, flexible, and cost-effective solution for transporting multiple E1/T1 links, high-speed data and Ethernet over a fiber link, to distances of up to 110 km (68 miles).

The device multiplexes up to 16 E1/T1 links and 100 Mbps Ethernet traffic into a fiber optic proprietary uplink.

The fiber optic link is available with single-mode, multimode, and single-mode over single fiber interfaces.

## NETWORK INTERFACES

Various interfaces (based on SFP transceivers) are available for both the active and the backup uplinks (see *Table 1* and *Ordering Options*):

- 1310 nm short or long-haul laser and 1550 nm long-haul laser interfaces for extended range over single-mode fiber
- Single fiber interface using WDM technology, with the laser transmit signal at a different wavelength than the receive signal (1310 nm and 1550 nm).

## RESILIENCY

Upon link failure, the unit automatically switches to an optional second uplink as a backup.

## E1/T1 INTERFACE

Optimux-134/125 multiplexes 16 E1/T1 channels. The E1/T1 interfaces comply with the ITU-T G.703. Line coding is HDB3 or B8ZS, respectively. A pair of LEDs monitors loss-of-signal and AIS on each E1/T1 receive line.

## ETHERNET INTERFACE

Optimux-134 and Optimux-125 feature fast Ethernet ports enabling a full 100-Mbps Ethernet connection in addition to the capacity of the 16 E1/T1 channels. The Optimux devices are supplied with a 10/100BaseT Ethernet USER port. This port is activated via a software key.

## TIMING

The Optimux devices transmit each E1/T1 channel separately so that the clock of each E1/T1 channel is independent.



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## Fiber Multiplexers for 16 E1/T1 and Ethernet

### MARKET SEGMENTS AND APPLICATIONS

#### Private Networks

In private networks, Optimux-134/125 shares campus services such as Ethernet, voice, data and video in P2P (*Figure 1*) and Star topologies over dark fiber.

Optimux-134/125 establishes TDM and Ethernet connectivity between the remote branches and headquarters for educational, financial, military sectors.

#### Traffic Backhaul Application

Optimux-134/125 transparently backhauls TDM and Ethernet traffic over fiber or coax uplink (see *Figure 3*).

Optimux devices connect cellular base stations to controllers. This solution meets the requirements of cellular backhaul applications by providing TDM and Ethernet traffic for CDMA and GSM connectivity.

The Optimux units backhaul WiMAX traffic from remote locations over dark fiber links at a distance of up to 110 km (68.3 miles).

### MONITORING AND DIAGNOSTICS

Optimux features comprehensive test and diagnostic capabilities that include local and remote loopbacks on the uplink interface and on each E1/T1 port.

To ease system diagnostics, Optimux features LED status indicators and AIS alarm generation and recognition.

The devices also feature dry contact closure upon link failure. An optional alarm port is available with dry relay contacts for major and minor alarms.

### MANAGEMENT AND SECURITY

The Optimux units can be configured and monitored with a number of management and diagnostic tools. An ASCII terminal provides local management. Remote management and diagnostics can be performed via Telnet, a RAD Web-based management application or an SNMP-based management application.

### ARCHITECTURE

Optimux-125 is a compact, 1U-high unit. Optimux-134 is available in a 1U-high version with balanced E1 interface, and RJ-45 connectors, or a 2U-high version with unbalanced E1 interface, and BNC or IEC-169/13 connectors. The units with IEC-169/13 connectors are equipped with DIP switches to disconnect GND from the Rx signal).

All the units can be mounted in a 19-inch rack.

### POWER

The wide-range AC/DC power supply can be connected to either an AC power source (90 to 260 VAC), or a DC power source (-40 to -125 VDC). The units can also be ordered with a +24 VDC (20 to 72 VDC) power supply.

A second power supply can be ordered for power redundancy.

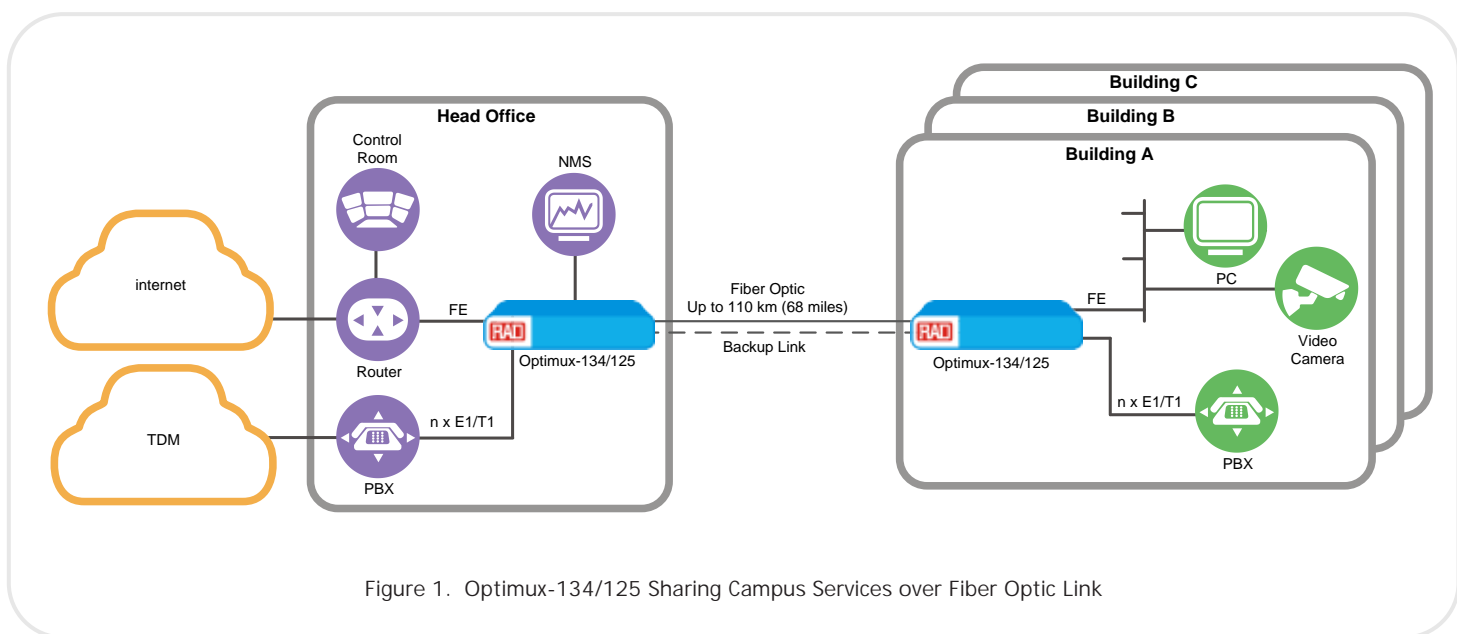


Figure 1. Optimux-134/125 Sharing Campus Services over Fiber Optic Link

## Specifications

### OPTICAL INTERFACES (MAIN AND BACKUP)

#### Data Rate

OP-134: 135.168 Mbps (RAD proprietary)

OP-125: 127.38 Mbps (RAD proprietary)

#### Interface Options

See *Table 1*

**Note:** It is strongly recommended to order this device with **original RAD SFPs installed**. This will ensure that prior to shipping, RAD has performed comprehensive functional quality tests on the entire assembled unit, including the SFP devices. RAD cannot guarantee full compliance to product specifications for units using non-RAD SFPs.

#### Connectors

SFP interfaces with LC connectors

#### Compliance

OP-134: ITU G.703, G.742, G.823, G.955, IEEE 802.3

OP-125: ITU G.703, G.824, G.955, IEEE 802.3

### ETHERNET USER INTERFACES

Activated via a software key for full bandwidth of 100Mbps

#### Type

10/100BaseT

#### Connectors

RJ-45

### E1/T1 USER INTERFACES

#### Number of Channels

16

#### Data Rate

E1: 2048 kbps

T1: 1544 kbps

#### Impedance

E1 balanced: 120Ω

E1 unbalanced: 75Ω

T1 balanced: 100Ω

#### Connectors

E1 balanced: RJ-45

E1 unbalanced: BNC or IEC-169/13 (in 2U unit)

**Note:** For balanced and unbalanced channels in the same unit, order a 1U-high unit and one CBL-RJ45/BNC/E1/X adaptor cable for each pair of BNC connectors.

T1 balanced: RJ-45

### CONTROL PORT

#### Type

RS-232 DCE asynchronous

#### Data Rate

9.6, 19.2, 38.4, 57.6, 115.2 kbps

#### Connector

9-pin D-type female

### ALARM PORT

#### Type

Dry relay contacts for major and minor alarms

#### Connector

9-pin D-type female

### INDICATORS

#### Power

Off – Not powered

On (green) – Normal operation

On (red) – Power malfunction

#### System

TST (yellow) –

On: Diagnostic loop is performed or power-up

Flashes: Autobaud detect process

FLT (red) – Power-up

#### Link SFP (per port)

SYNC LOSS (red) – Signal loss or frame loss detected on uplink

AIS – Not active

#### User Ethernet Port

LINK/ACT (yellow) –

On: LAN status is up

Flashes: LAN traffic transfer

100 (green) –

On: 100-Mbps operation

Off: 10-Mbps operation

#### E1/T1 Interface (per port)

SYNC LOSS (red) – Signal loss detected on E1/T1 link

AIS (yellow) – AIS detected on E1/T1 link

#### Management Port

LINK/ACT (yellow) –

On: LAN status is up

Flashes: LAN traffic transfer

100 (green) –

On: 100-Mbps operation

Off: 10-Mbps operation

### DIAGNOSTICS

Local and remote loopbacks on uplink and on each E1/T1 port

### TIMING

Uplink: internal

E1/T1 port: transferred transparently, independent for each channel

## Optimux-134, Optimux-125

### Fiber Multiplexers for 16 E1/T1 and Ethernet

#### GENERAL

##### Power

Wide range power supply:

AC: 90 to 260 VAC

DC: -48 VDC (-40 to -125 VDC)

24 VDC (20 to 72 VDC)

##### Power Consumption

Wide range power supply:

AC: 36 VA max

DC: 14W max

24 VDC power supply:

12W max

#### Physical

1U-high

Height: 4.4 cm (1.8 in)

Width: 44 cm (17 in)

Depth: 24 cm (9 in)

Weight: 3.5 kg (8 lb)

2U-high (Optimux-134 only)

Height: 8.8 cm (3.5 in)

Width: 44 cm (17 in)

Depth: 24 cm (9 in)

Weight: 4.0 kg (9 lb)

#### Environment

Temperature: 0°–55°C (32°–131°F)

Humidity: Up to 90%, non-condensing

Table 1. Uplink Interface Options

Module Name (Ordering Option)	Transmitter Type and Wavelength [nm]	Connector Type	Fiber Type	Typical Output Power [dBm]	Receiver Sensitivity	
					[dBm]	[dBm]
SFP-12 (Optimux-134 in 34 mode only)	–	SMB	Coax cable	–	–	
SFP-1	LED, 1310	LC	62.5/125 Multimode	-18	-30	
SFP-2	Laser, 1310	LC	9/125 Single mode	-12	-28	
SFP-3	Long haul laser, 1310	LC	9/125 Single mode	-2	-34	
SFP-4	Long haul laser, 1550	LC	9/125 Single mode	-2	-34	
SFP-10A	Laser WDM, Transmit: 1310, Receive: 1550	LC	9/125 Single mode (single fiber)	-12	-28	
SFP-10B	Laser WDM, Transmit: 1550, Receive: 1310	LC	9/125 Single mode (single fiber)	-12	-28	
SFP-18A	Laser WDM, Transmit:1310 Receive:1550	LC	9/125 Single mode (single fiber)	-2	-28	
SFP-18B	Laser WDM, Transmit: 1550 Receive: 1310	LC	9/125 Single mode (single fiber)	-2	-28	
SFP-19A	Laser WDM, Transmit: 1490 Receive: 1570	LC	9/125 Single mode (single fiber)	+2	-30	
SFP-19B	Laser WDM, Transmit: 1570 Receive: 1490	LC	9/125 Single mode (single fiber)	+2	-30	
SFP-24	VCSEL, 850	LC	50/125 Multimode (134/125 mode only)	-8	-25	
			62.5/125 Multimode	-8	-25	

**Note:** Typical ranges are calculated according to attenuation of 0.4 dB/km for 1310 nm, 0.25 dB/km for 1550 nm for single mode fiber.

# Optimux-134, Optimux-125

## Fiber Multiplexers for 16 E1/T1 and Ethernet

### Ordering

#### RECOMMENDED CONFIGURATIONS

##### OP-134/DCR/B/100M

Optimux-134, dual +24/-48 VDC power supply, no alarm port, balanced E1 interface (RJ-45, 1U-high unit), license activation key for operating the 10/100BaseT Ethernet port at 100 Mbps

##### OP-134/PSR/B

Optimux-134, dual wide range power supply (90–260 VAC, -40 to -125 VDC), balanced E1 interface (RJ-45, 1U-high unit), no alarm port

##### OP-134/PSR/U/A/100M

Optimux-134, dual wide range power supply (90–260 VAC, -40 to -125 VDC), unbalanced E1 interface (BNC, 2U-high unit), alarm port, license activation key for operating the 10/100BaseT Ethernet port at 100 Mbps

##### OP-125/PSR/A/100M

Optimux-125, dual wide range power supply (90–260 VAC, -40 to -125 VDC), , alarm port, license activation key for operating the 10/100BaseT Ethernet port at 100 Mbps

##### OP-125/DCR/A/100M

Optimux-125, dual +24/-48 VDC power supply, alarm port, license activation key for operating the 10/100BaseT Ethernet port at 100 Mbps

#### SPECIAL CONFIGURATIONS

Please contact your local RAD partner for additional configuration options.

#### Uplink Interface (SFP)

Table 1 specifies the uplink interface options. To order uplink interface from RAD, refer to the *SFP Transceivers Data Sheet* at [www.rad.com](http://www.rad.com).

It is strongly recommended to order this device with **original RAD SFPs installed**. This will ensure that prior to shipping, RAD has performed comprehensive functional quality tests on the entire assembled unit, including the SFP devices.

*Notes: 1. When ordering redundant SFPs, they must be identical.*

*2. Single-fiber SFPs should always be used opposite the reciprocal single fiber SFP. For example, SFPs-10A should be used opposite SFP-10B.*

*3. RAD cannot guarantee full compliance to product specifications for units using non-RAD SFPs.*

*4. Optimux-134, Optimux-125 are supplied with two SFP sockets, the transceivers must be ordered separately.*

#### SUPPLIED ACCESSORIES

AC or DC power cord

##### RM-34

Kit for mounting one 1U-high unit in a 19-inch rack (balanced units only)

##### RM-36

Kit for mounting one 2U-high Optimux-134 unit in a 19-inch rack (unbalanced units only)

#### OPTIONAL ACCESSORIES

##### OP-134-LIC-ETH/100M

##### OP-125-LIC-ETH/100M

Software keys for activating the 10/100BaseT Ethernet port at 100 Mbps

##### OP-134-PS

##### OP-125-PS

Wide range 90–260 VAC/-48 VDC power

supply modules for adding a redundant power supply to an existing unit or replacing the original power supply module

##### OP-134-PS/DC

##### OP-125-PS/DC

+24/-48 VDC power supply modules for adding a redundant power supply to an existing unit or replacing the original power supply module

##### OP-134-PS-BP

##### OP-125-PS-BP

Blank panels for power supply modules

##### CBL-RJ45/2BNC/E1/X

RJ-45 to BNC adapter cross-cable (for use with 1U Optimux-134 chassis)

##### CBL-DB9F-DB9M-STR

Control port cable

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